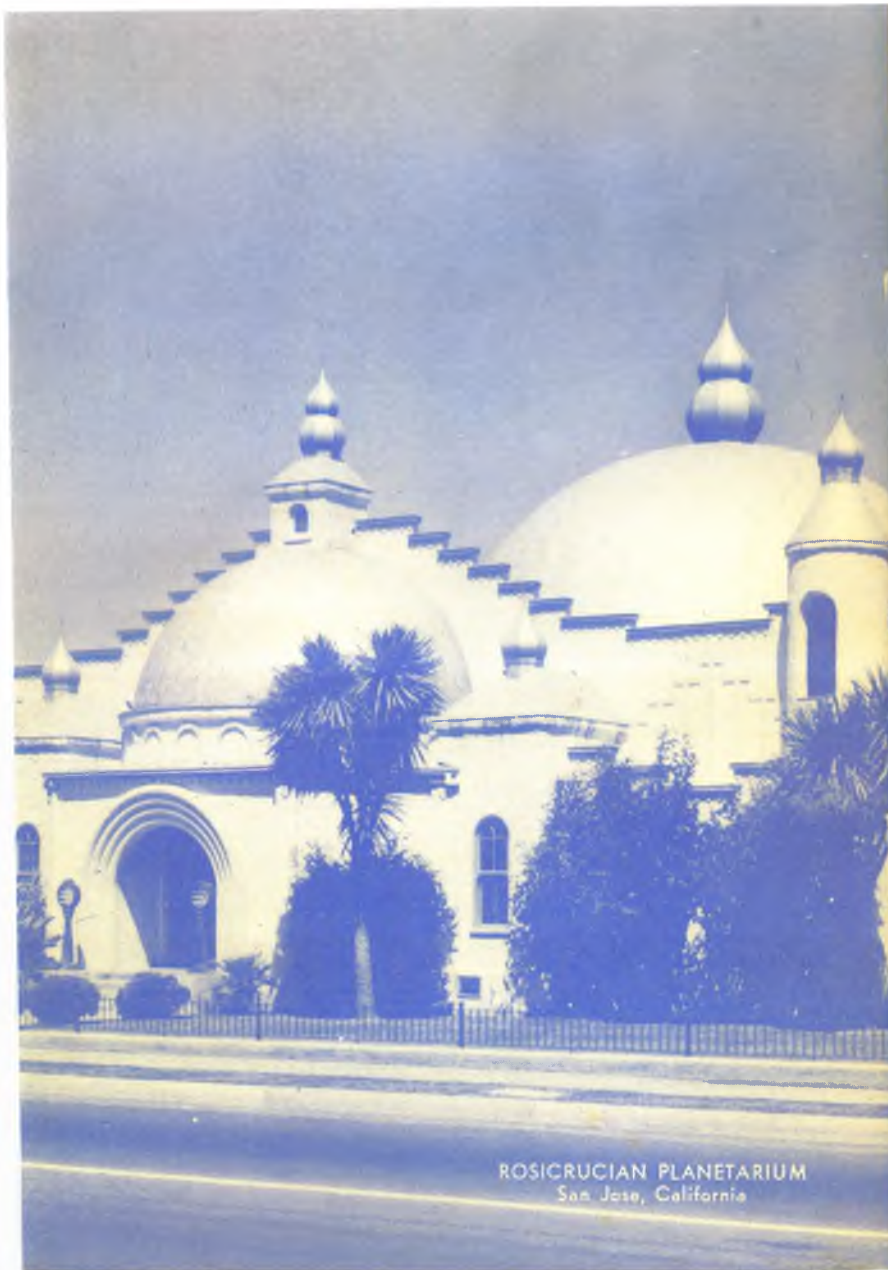


Our Cosmic Neighbors

Story of the Stars





ROSICRUCIAN PLANETARIUM
San Jose, California

Our Cosmic Neighbors

Story of the Stars

By RODMAN R. CLAYSON, F. R. C.
Member, Astronomical Society of the Pacific
Eastbay Astronomical Association



Issued by the
ROSICRUCIAN PLANETARIUM
Rosicrucian Park, San Jose, California

Copyright, 1948
by
The Supreme Grand Lodge of AMORC, Inc.

First Edition, 1948
Second Edition, 1954

LITHO IN U. S. A.

THE ROSICRUCIAN PLANETARIUM

The Theater of the Sky

THE ROSICRUCIAN PLANETARIUM is called "The Theater of the Sky" because it presents the greatest drama of all the ages—the mythological traditions and cosmic roles of the planets and the stars, revealing their surprising mysteries and giving young and old a clearer conception of the wonders of the heavens. There are now about two dozen planetariums in the United States and each of these has been built at a considerable outlay of money and time.

While comfortably seated in the domed amphitheater of the Planetarium, the spectator may see over his head a reproduction of the heavens, to be seen otherwise only on clear dark nights; but in the Planetarium, within a few minutes, the spectator can see a movement of the stars and planets and a change in the heavens that would take a century to view through a telescope. The Planetarium spectator pulls aside the curtain of time—removes the barriers of space and sees the universe on parade. He can gaze upon the same heavens, the same arrangement of stars which guided Columbus on his epochal journey across the watery wastes of the Atlantic. He can see a presentation of the heavens as they appeared at various times in the world's history.

The Planetarium is owned and operated by the Rosicrucian Order, AMORC, and is open to the public for demonstration at regular periods weekly, at a nominal admission charge. Students of astronomy and lovers of nature's mysteries will be enthralled by this scientific visual presentation of the universe. Lectures are given so that the lay mind may grasp in a few moments an understanding of the fundamentals of the astronomical sciences. Planetarium demonstrations are definitely not motion pictures, but the result of an elaborate ingenious, complex device, which duplicates the motions of stars and planets, and accelerates their movement thousands of times.



Rosicrucian Park, San Jose, California

CONTENTS

	PAGE
Circular Star Chart for the Year.....	4
Preface	5
Chart for Position of the Big Dipper.....	6
Ursa Major	6
Ursa Minor	7
Draco.....	8
Cassiopeia	8
Cepheus.....	9
Andromeda	9
Perseus	10
Pegasus	10
Hercules	11
Boötes	12
Corona Borealis	12
Cygnus	13
Lyra	14
Aquila	14
Ophiuchus and Serpens.....	15
Pisces	16
Aries	16
Triangulum	17
Aquarius	17
Capricornus	17
Scorpius	18
Sagittarius	19
Cancer	19
Leo	20
Virgo	21
Libra	21
Auriga	22
Gemini	22
Orion	23
Canis Major and Canis Minor.....	24
Taurus, the Pleiades and Hyades.....	25
Solar System and Chart.....	26
The Sun, Planets and Moon.....	27-30
Illustration of Moon Phases.....	28
Stars	30
The Light-Year	31
Comets and Meteors.....	31
Precession of the Equinoxes.....	32
Illustration of Zodiacal Signs.....	33
Table of Bright Stars.....	35



This chart represents the inverted bowl of the night sky. It reveals the outstanding constellations which may be seen in any season of the year from Latitude 40° North. Constellation pictures on the following pages should be referred to this chart for orientation with neighboring star groups.

PREFACE

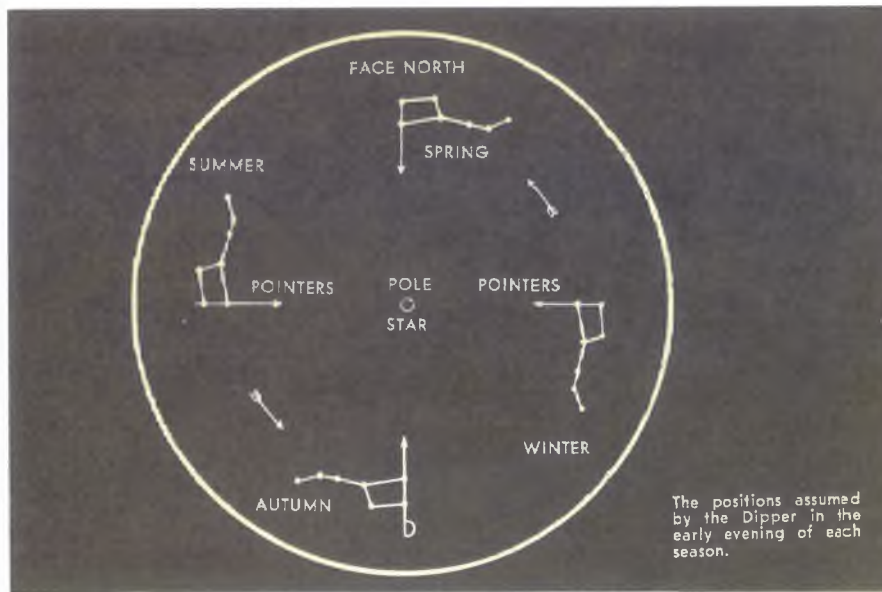
THIS little book is for those men, women, and children who desire to become better acquainted with the stars of the night. While our information is factual and the charts are accurate, no attempt has been made to delineate the technical phases of celestial mechanics. Our efforts have been devoted to descriptive and observational astronomy. Through the use of this volume the amateur stargazer can have a full appreciation of the heavens without the aid of a telescope.

The legendary stories of the constellations have come down to us through the ages from the ancient Egyptians, Babylonians, Greeks, Romans and others. These early peoples endeavored to relate the curious groupings of stars to things that were familiar to them such as the lion, bear, eagle, warrior, etc. And thus were born romantic mythological accounts of truths and principles best known to the early men who conceived them. Today we still use the names that they gave to the constellations of stars. Perhaps their history is written in the night sky!

Modern astronomers, however, see more than legends in the stars. With their great telescopes and other astronomical instruments they have determined the distance to stellar objects, their speed of movement, their heat and light radiation, size, mass, and other interesting data. With increasing knowledge the universe seems to expand. We now know that all stars are suns, that our star-sun is a part of the Milky Way which is composed of millions of star-suns, that this galaxy is only one of thousands, that the constellation of Sagittarius, which is 30,000 light-years distant, is the hub of our galaxy and that all stars in our galaxy are swinging around it.

And probably most important of all, we now know that the movements of all heavenly bodies conform to a definite infinite system of law and order. A replica of the solar system is found even in the lowly atoms of the earth. "As above, so below."

May the reader find in these pages inspiration and an understanding of the scintillating light of the stars which in their majestic march across the heavens warm the coldness of space and illuminate the dark deeps of the firmament.



URSA MAJOR

THE BEST KNOWN group of stars in the Northern Hemisphere is Ursa Major, the Great Bear. It has seven stars, four of which form the bowl of a dipper, and the remaining three resemble a bent handle. This constellation is frequently called the "Big Dipper."

Near Mizar, the second star in the handle, we find the star Alcor. In some legends these are called the Horse and Rider. Alcor is very faint and was known to the Arabs as a test of eyesight for entrance into their army. The stars in the end of the bowl are the pointers, and a line through them will lead you to Polaris, the Pole Star.

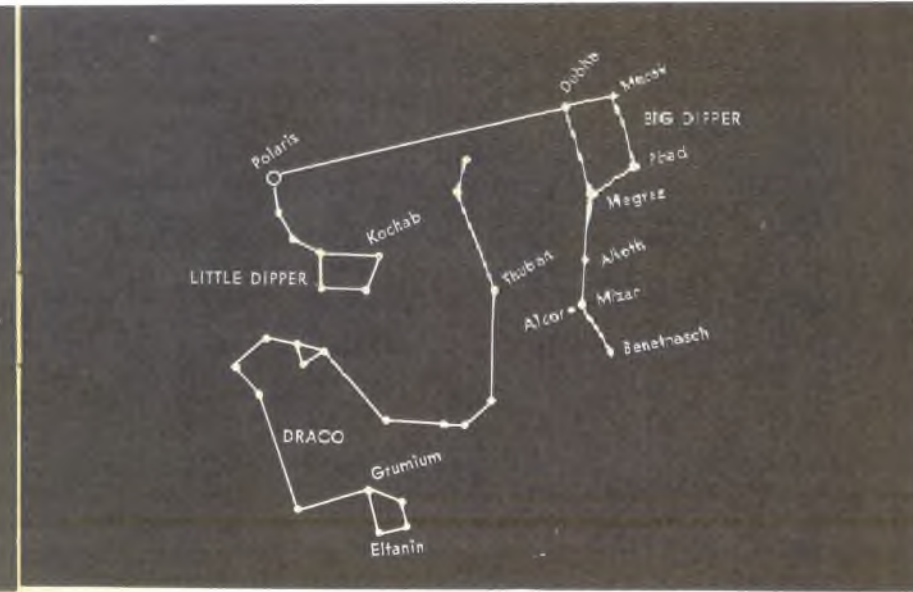
Alcor is 72 light-years away and 11 times as bright as the sun. The Indians say that the bowl was a great bear and that the three stars in the handle were hunters.

Astronomers have counted 150,000 stars in the bowl of the Big Dipper.



Both the Big and Little Dippers swing around the North Star, Polaris, in 23 hours and 56 minutes.

If the Big Dipper is watched consistently night after night, one can soon learn to tell time by its position. It has a gain of 4 minutes in every 24 hours.



URSA MINOR

ASSOCIATED WITH the Big Dipper is a smaller group of stars known as Ursa Minor, the Little Bear. It is also called the Little Dipper, and at the end of the handle we find the North Star, Polaris. For a bear, this constellation seems to have an unusually long tail.

The Dippers are among the circumpolar constellations, and swing completely around the North Star every day.

Polaris is of the third magnitude in brightness and is 250 light-years distant. Polaris is actually 4 stars when seen with larger telescopes.

Polaris is called our Pole Star because it is very nearly over the northern axis of the earth—there being a difference of $1\frac{1}{2}$ degrees.

Mythology

Greek mythological stories speak of the "Bears" when they relate how Juno had Callisto, of whom she was jealous, turned into a bear. Arcas, Callisto's son, met his mother one day while he was hunting. He did not recognize her. He was about to shoot her with an arrow when Jupiter picked up both of them quickly and placed them in the sky as Ursa Major and Ursa Minor.

DRACO

The Dragon

DRACO, THE DRAGON, twists around the celestial Northern Hemisphere with its tail between Polaris and Ursa Major. The brightest star in Draco is Thuban. Because of the precession of the equinoxes, the celestial pole moves among the stars; and because of this, Thuban was the North Star about 5,000 years ago. The Great Pyramid in Egypt was not only orientated to the cardinal points of the compass, but it was so arranged that the light from Thuban shone directly down one of its passages, at that time.

Thuban is a yellow star of 3.5 magnitude.
Most of Draco can be seen the year round.

Mythology

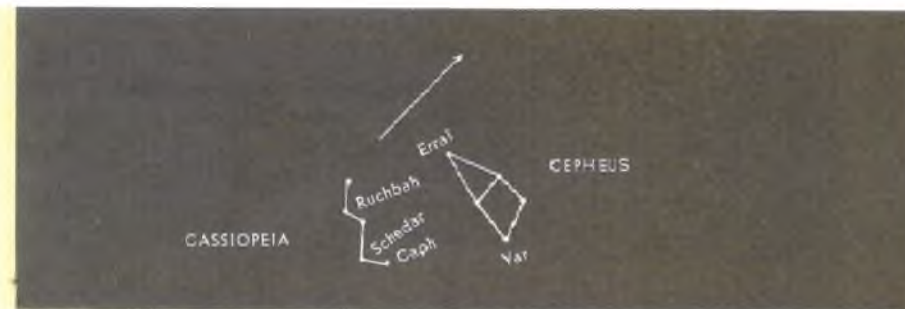
A long winding stream of stars was placed by primitive man at the "top of the sky." According to a Greek legend, Draco represents the Dragon that guarded the Golden Apples in the Garden of Hesperides. This dragon was finally killed by Hercules and was placed in the sky in a position where it would never set, and would always remain on guard. The Dragon was the terrible Typhon that caused Pan to jump into the Nile River, and also caused Venus and her son, Cupid, to take refuge in the Euphrates River.

One cannot look at the dragon with its coils wrapped around Thuban, the former Pole Star, without recalling the Hindu legend about the snake that was wrapped seven times around the axis of the earth; the gods and demons pulling back and forth on its head and tail caused the earth to spin on its axis. Biblical Job referred to Draco as the "crooked serpent." Draco is identified with the serpent of the "Garden of Eden," and also the dragon which was overcome by Michael the Archangel.

CASSIOPEIA

The Royal Family

CASSIOPEIA, better known as the Queen, is one of the most popular of constellations, because in the arrangement of its principal stars there is the suggestion of a chair, and it is easy to imagine it as being occupied by the Queen.



This constellation is found directly across the Pole from Ursa Major. Both are circumpolar constellations, so when one is high in the sky, the other is low over the northern point. Cassiopeia is characterized by a zigzag row of second magnitude stars, forming an irregular "M" or "W" according to their direction from the North Star.

All navigators are familiar with the Queen, for on navigation charts she is found on zero, Greenwich Meridian.

It was in the constellation Cassiopeia that Tycho's star blazed out in November, 1572.

CEPHEUS

To the right of Cassiopeia is the companion constellation known as King Cepheus.

Not being very bright, the stars of Cepheus are rather difficult to identify. The star Gamma in Cepheus will be the Pole Star in the year 6,000, due to its circumpolar movement.

ANDROMEDA

THIS CONSTELLATION seems to branch off from one corner of the Great Square of Pegasus, and lies in the general direction of Cassiopeia.

This group of stars is noted chiefly for its Spiral Nebula. When conditions are good, this flat, whirling pinwheel-like mass may be seen with the naked eye.

The Andromeda Nebula is 900,000 light-years distant. One of the brighter stars in Andromeda is Epsilon, which is traveling toward our solar system at the rate of 52 miles a second.





PERSEUS

By following one of the lines of stars in Andromeda toward the east, we come to the next constellation—Perseus.

Its formation of stars somewhat resembles the capital letter "A." In Perseus we find a hazy double cluster of stars.

One of the brightest stars in this constellation is Algol of third magnitude. It is a variable, and decreases and increases in brightness every three days.

PEGASUS

The Winged Horse

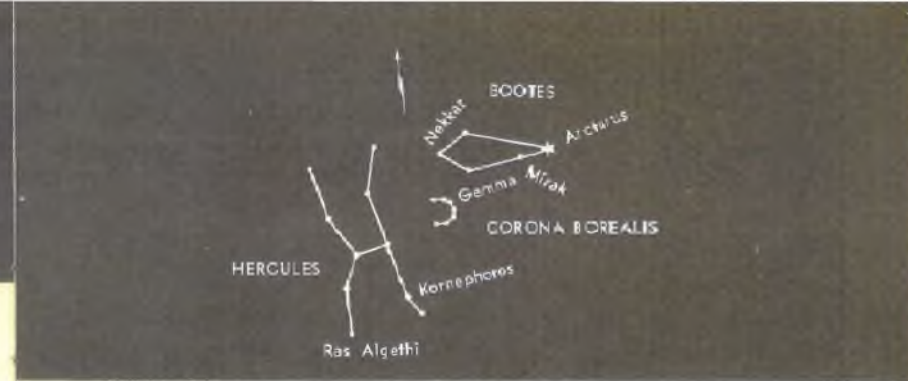
PEGASUS, THE WINGED HORSE, is a large constellation of fairly bright stars forming a nearly perfect square. It is found just a little south of overhead during the fall months of the year. The figure outlined by the stars bears no resemblance to a horse. However, the Great Square is sometimes said to be the stall of Pegasus.

This constellation lies south of Cassiopeia and Cepheus, and on November 1st is directly overhead at the zenith.

Mythology

The following story is often titled "The Royal Family."

It is said that Cassiopeia and King Cepheus ruled an ancient kingdom. Their daughter was Andromeda. Now, the queen was very vain about her own beauty and boasted that she was more beautiful than the sea nymphs. Neptune became angry and sent a dragon to ravage the seacoast. Cassiopeia appealed to Jupiter and learned that her daughter must be sacrificed to the dragon in order to appease the anger of the god of the sea. So Andromeda was chained to a rock on the seacoast, from which she was subsequently rescued by Perseus who was riding his winged horse, Pegasus.



Before rescuing Andromeda, Perseus had been sent on a journey to bring back the head of Medusa. This was the dreadful woman whose hair was changed into serpents. She had the power of turning to stone anyone who looked upon her. Perseus cut off her head and from the blood which dripped into the sea a white winged horse was born. After mounting the horse, which became known as Pegasus, Perseus was flying home when he came upon the predicament of the fair Andromeda and hastened to rescue her.

HERCULES

JUST EAST of the Crown is the constellation of Hercules. It has no brilliant star, but six of its members outline a figure shaped like a key-stone. This group also resembles a butterfly.

In this constellation is found the "great star cluster in Hercules." Its distance is 34,000 light-years.

One of its faint stars, Gamma, will be the pole star in 16,000.

This circumpolar constellation rises in March.

Mythology

This group is often known as the Kneeler. Old pictures show Hercules kneeling with his foot on the head of Draco, the Dragon.

Among the twelve labors which Hercules was to carry out in response to the wishes of the gods, was one where he was to obtain the Golden Apples of Hesperides. These were guarded by the dragon. After Hercules slew the dragon and seized the apples which represented knowledge and life, he succeeded in bringing up the three-headed dog, Cerberus, the guardian of the lower world.



BOOTES

The Bear Driver

THIS KITELIKE figure of stars is well known. At the foot of the constellation is the bright star, Arcturus.

Arcturus is of reddish color and is one of the brightest stars in the sky. It is 36 light-years distant. Its light opened the Chicago World's Fair in 1933. This light was received in the Yerkes Observatory telescope, changed into electricity, sent over telegraph wires to Chicago, and closed the switch which controlled the lights.

This is a large star 26 million miles in diameter, and it is 86 times as bright as the sun. It is moving through the sky at the rate of 75 miles a second. Boötes is mentioned in Homer's *Odyssey*.

Boötes rises in February.

Mythology

Boötes, sometimes called the Bear Driver, is said to be driving the Bears around the pole of the sky. Sometimes he is called the Plowman, because the Great Dipper is known as the plow in some lands.

Boötes was sometimes called Atlas. The Greek legend relates that the demigod, Atlas, supported the heavens on his shoulders until he was turned into a mountain when he looked into the face of Medusa.

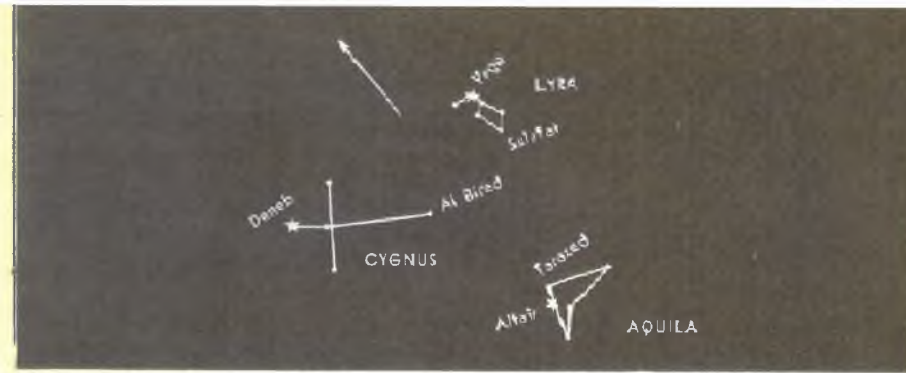
Arcturus is one of the few stars mentioned in the Bible. It is from the Greek word *Arktos*, meaning "guardian." This signified the Bear Guardian. After the two Bears had been placed in the sky, people probably felt that it was necessary to have someone look after them. It was in this way that the early races wrote their legends in the sky so that they could never be erased; and thus did the stars get their names.

CORONA BOREALIS

The Crown

NORTHEAST OF ARCTURUS lies a nearly perfect semicircle of seven stars, long known as the Crown or Wreath. One jewel in the crown is brighter than the others. This star's name is Alphecca; it is of third magnitude. A nova appeared in the crown in 1866 and again in 1946.

Corona Borealis rises in March.



Mythology

The Indians say that the stars forming the Crown are seven Indian chiefs sitting around the council fire with the Great Spirit.

According to legend Bacchus, the god of wine, discovered the maiden Ariadne in the forest, and having won her as his bride, presented her with a crown of glittering gems. Ariadne became ill and died; and Bacchus, in order to do away with the beautiful crown which constantly reminded him of his sorrow, tossed it high in the air. As the crown rose, the gods fixed it in the sky where it still forms the beautiful constellation *Corona*.

CYGNUS

The Swan

THIS CIRCUMPOLAR constellation in the midst of the Milky Way contains the Northern Cross. There are five stars in the upright part of the cross, the brightest star, Deneb, being at the top. The cross-piece is marked by two fairly bright stars, one at either extremity. Deneb is 10,000 times as bright as the sun, and 540 light-years away. It is of first magnitude.

The spectroscope shows that Deneb is a double star, and that it is approaching us at the rate of 2.5 miles a second. It will be the pole star for the earth in 8,000 years. A large open space near Deneb, in which few stars are seen, is called the "Northern Coalsack" by astronomers.

Cygnus rises in April and sets in January.

Mythology

To the ancients, this constellation looked like a flying swan—hence the name *Cygnus*. It is recounted in legends that Orpheus was



changed into a swan at death, and placed in the sky near his golden lyre. Perhaps it was not simple fancy that gave rise to the story of the dying Cygnus as having been changed into a swan winging its way into the heavens. This may have been the allegorical method of declaring belief in immortality.

LYRA—The Harp or Lyre

THIS GROUP has but one bright star—Vega. This brilliant white star is second only to Sirius in the sky. Inasmuch as this is a circumpolar constellation, Vega will be the pole star in the year 13,000. It is 26 light-years away and 52 times brighter than the sun.

Our sun with its family of 9 planets is moving through the sky toward Vega at the rate of 12 miles a second. If Vega were stationary, we would reach it in 500,000 years. However, the star is rapidly receding.

In Lyra we find the interesting ring nebula.

Lyra rises with the beginning of spring and sets in December.

Mythology

From classical mythology we learn that Mercury constructed a harp out of the back of a tortoise and presented it to Apollo, who passed it on to his son, Orpheus. By playing beautiful strains on his lyre, Orpheus rescued his wife from Hades. However, he lost her again, and thereafter could play only mournful tunes. This resulted in his being killed by those who wished to be gay. Apollo then took back the harp and placed it in the heavens as a bright constellation.

AQUILA—The Eagle

THE BRIGHTEST star in this summer constellation is Altair; it is of first magnitude. Its blue luster is $16\frac{1}{2}$ light-years distant, and is nine times brighter than the sun.

Close observation will reveal the Milky Way running through Aquila.

Aquila rises early in June and is seen until the beginning of winter.

Mythology

This constellation is known as the Eagle, and its history can be traced back to a remote period when, in the Euphratean valley, it was Alula, the Akkadian eagle, the symbol of the sun and an object of worship.



According to Grecian mythology, it was the eagle that Jove kept beside his throne. Aquila was known as the messenger of Jove, and it was often represented as bearing aloft the youth Ganymede, whom Jupiter wished to secure as his cupbearer and whom he sent the Eagle to seize.

OPHIUCHUS and SERPENS

THE CONSTELLATIONS of Ophiuchus and Serpens are connected, and the observer has a difficult time clearly defining the intermingling lines of stars. These star groups lie between Hercules and Scorpius. They are supposed to represent a man bearing or wrestling with a serpent. The Serpent crosses the body of Ophiuchus.

There are no bright stars in these constellations.

If Ophiuchus and Serpens are counted separately, there is a total of 89 constellations. Ophiuchus rises in May.

Mythology

On old star maps, Ophiuchus is a giant holding the Serpent between his knees. It is related that Ophiuchus was said to represent Aesculapius, the great physician and god of medicine. His skill was reputed to be so great that he could restore the dead to life. Pluto became alarmed lest the lower world become depopulated, so he persuaded Jove to remove Ophiuchus to the sky.

Serpents were always associated with the god of medicine, and

Ophiuchus is generally represented as holding a staff around which serpents are entwined. Undoubtedly, this is the origin of the Caduceus, the symbol now used by physicians.



PISCES

The Fishes

PISCES, THE FISHES, is another one of the constellations in the Zodiac. It is composed of a lone line of faint stars usually represented as two fishes tied at the ends of the ribbon. This ribbon of faint stars is sharply bent near its center. The Western Fish is marked by a small circlet of stars immediately south of the Square of Pegasus. The Northern Fish is at the other end of the ribbon.

There are no bright stars in the group. It was in this constellation that the triple conjunction of Mars, Jupiter, and Saturn took place in 6 B.C., and some persons connect this striking combination of planets with the Star of Bethlehem.

Pisces rises in August.

Mythology

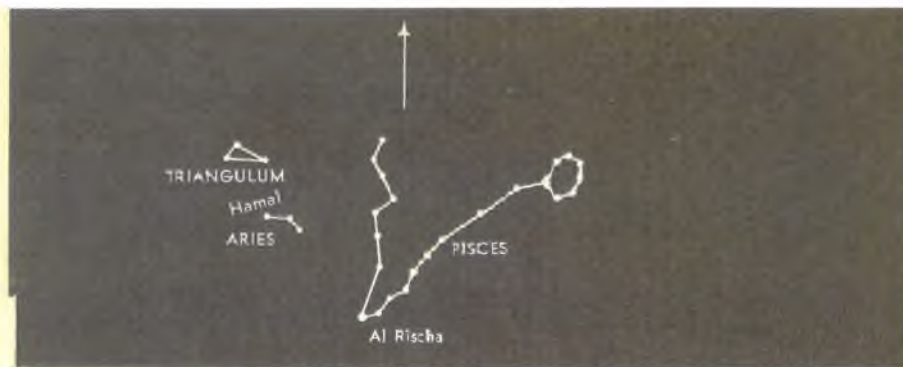
From Greek mythology we find that Venus and her son Cupid were walking along the Euphrates River when the terrible giant Typhon appeared. They were badly frightened and in order to escape leaped into the water and assumed the form of two fishes. Later the fishes were placed among the stars by Minerva.

ARIES

The Ram

ARIES THE RAM, is considered to be the first constellation in the Zodiac; however, due to the precession of the equinoxes this point is now in Pisces. Its inconspicuous three stars form a small triangle which early peoples pictured in the head of the Ram. Undoubtedly this was because the Ram was thought to be the first-born in the springtime. Years ago the sun was near this point of the Zodiac at the beginning of spring, or the spring equinox.

Aries rises in September.



TRIANGULUM

THIS GROUP of stars known as the Triangle is found just above Aries. This little constellation is of great antiquity and the ancients regarded it very highly. It seemed significant that it conjoined Aries, the leader of the Starry procession. Aries was regarded as the sign of creative regeneration, and it seemed well placed near the symbol of the triangle.

In Triangulum is a fine spiral nebula.

Triangulum rises in September.

AQUARIUS

The Water Carrier

IN THIS zodiacal constellation we find a group of four stars forming a "Y" and this marks the jug of water from which Aquarius is pouring water to keep the fishes of Pisces alive and happy. A long line of stars runs south from the jug to the bright star Fomalhaut. There are no bright stars in Aquarius. Part of this irregular constellation extends westward over Capricornus.

The word *Aquarius* means "Water Carrier."

Aquarius rises on the first of July.

CAPRICORNUS

Sea Goat

THE STARS in this constellation are faint and not well defined. At one time it was said that on reaching Capricornus the sun turned back on December 23 and began climbing the sky again like a goat. This zodiacal constellation was known as the Sea Goat, to the Chaldeans. Its





fish-tail is symbolical of the stormy days of winter, and it is significant that Capricornus lies in that part of the heavens known as the sea. It is sometimes called, The Gate of the Gods, or The Gate of Men, for followers of Plato maintained when the soul was liberated from the body, it passed through Capricornus into the other world.

In Greek mythology the constellation is identified with Pan, the nature god of the woodlands and pastures.

The winter solstice occurs in Capricornus.

Capricornus rises in June.

SCORPIUS—The Scorpion

SCORPIUS, THE SCORPION, lies in the opposite part of the sky from Orion and is one of the most interesting and most brilliant of the twelve constellations of the Zodiac. It may be easily identified by its fishhook formation, which has a striking resemblance to the tail of a scorpion.

We find in it the brilliant red star, Antares. This word comes from Greek and means the rival of Mars. When the planet Mars is passing through that region of the sky it is likely to be mistaken for Antares, for they are both of a reddish color and of similar brilliance. Antares is the largest star yet seen by man. It is 90 million times as large as the sun and 14 times as bright. Its distance is 170 light-years.

Although Scorpius is a constellation of the Zodiac, very little of it lies in the ecliptic. It is said that at one time Libra was a part of the Scorpion and represented its claws.

Scorpius rises in April and is seen in the southern sky throughout the summer.

Mythology

Scorpius is alluded to in some legends as a snake or a crocodile, but usually as the Scorpion.



According to mythology, Juno had become incensed at the conceit of the hunter, Orion, and called upon the scorpion to sting him to death. It is recorded that the scorpion stung Orion on the heel. The fact that the stars of Orion disappear below the western horizon just as those of the Scorpion rise in the East, lends an air of reality to this oft repeated tragedy.

SAGITTARIUS

The Archer

SAGITTARIUS, THE ARCHER, is another of the constellations in the Zodiac. It lies in the Milky Way, east of Scorpius and south of Aquila, the Eagle. It can usually be recognized by two quadrilateral figures. One figure is like a dipper turned upside down and is often called the Milk Dipper because it lies in the Milky Way.

Sagittarius has no individual bright stars. This constellation is thought to be the hub of our galaxy. Many great star clouds of the Milky Way are found in Sagittarius. Many globular star clusters lie in this area.

Sagittarius rises in May.

Mythology

Sagittarius in Greek mythology represents the centaur Chiron, having the head of a man and the body of a horse. In his hands he holds a bow and arrow aimed at the heart of the Scorpion.

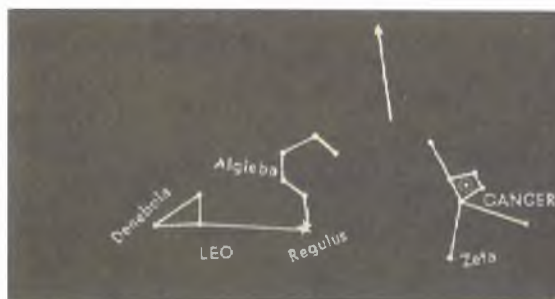
CANCER

The Crab

THERE ARE no bright stars in the constellation of Cancer, the Crab.

In its center, however, will be seen the silvery spot called *Praesepe*, or the Manger; and sometimes known as the Beehive. This is a cluster of small stars.





Immediately south of Cancer will be seen a small group of stars forming the head of Hydra whose long body extends across the sky toward the southeast.

Cancer has the faintest stars of any of the 12 constellations in the Zodiac. It rises late in December.

The summer solstice occurs in Cancer.

Mythology

The Chaldeans gave this constellation the name of Cancer or Crab because that animal's backward or oblique movement seemed to represent the sun's movement upon reaching this sign. The Crab was associated in ancient legends with early sun worship.

After the birth of Hercules, the jealous Juno sent the terrible Hydra to destroy him and also sent a crab to annoy him by pinching his heels. After Hercules had killed the Hydra and the Crab, both were transferred to the sky.

LEO—The Lion

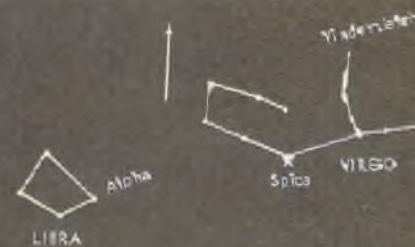
LEO, KNOWN as the Lion, is the constellation in the Zodiac which many years ago marked the sun's place in the sky on the hottest summer days. The sun was then said to have a lion's fierceness.

Leo is a group of stars forming a sickle with the bright star Regulus being at the end of the handle. The blade of the sickle was supposed to form the head, and Regulus, the heart of the lion.

Copernicus, who is credited with the present theory of the solar system, gave the name *Regulus* to this bright star in Leo.

Regulus is a white star 5 times greater in diameter than the sun. Its distance is 84 light-years.

To the east of the figure is a triangle, having one star, Denebola, brighter than the others. The triangle with this star represents the hindquarters and tail of the Lion.



Denebola is of the second magnitude, and is 32 light-years distant. From Greek mythology we learn that one of the twelve labors assigned Hercules by the gods was to slay the ferocious lion.

Leo rises in January and sets late in June.

VIRGO—The Virgin

VIRGO THE VIRGIN, is found just east of Leo. It is a rather large irregular-shaped constellation, having one very bright star—Spica. This is a beautiful white star of the first magnitude. It is 160 light-years away.

Virgo rises late in February.

Mythology

Virgo has long been called the goddess of the harvest. Sometimes she appears with wings; sometimes she holds a distaff in her hand, but for the most part she is found on charts carrying stalks of wheat or ears of corn.

Without a calendar, primitive man depended upon the position of the sun to inform him when to plow, sow, and reap. Having learned that his crop must be harvested when the sun reached a certain position among the stars, he naturally watched for definite objects which would designate this period.

Virgo was one of the first constellations to be thus considered by man, for it is found in the ancient records of every race.

LIBRA—The Scales

THIS CONSTELLATION, one of the twelve in the Zodiac, was once a part of Scorpius. It is said that Libra originally formed the claws of Scorpion. It contains no star brighter than the third magnitude but its chief stars form a four-sided figure which is represented on charts as the balance or weighing scales. It is the only sign in the Zodiac which does not represent an animate object.





The sun is considered to be in this constellation at the autumnal equinox when day and night are equal.

Interesting green stars may be seen in Libra.

Libra rises in March.

AURIGA—The Charioteer

AURIGA IS A large constellation, riding across the winter night sky, just above Orion.

Near it is a group of three faint stars called the Kids. If a star is borrowed from Taurus, we will observe Auriga as having the five-sided figure of a pentagon.

Auriga rises in October and sets in late spring.

Mythology

Auriga was said to have been a cripple, and to have invented the chariot; therefore, this is doubtless the reason that its five fairly bright stars hovering over Orion are called the Charioteer.

In an old story, Auriga was a goatherd, and he is always shown holding a kid in his arms.

GEMINI

The Twins

GEMINI, ANOTHER constellation in the Zodiac, extends in a north-easterly direction from Orion and its two parallel lines of stars culminate in the two bright stars, Castor and Pollux. Pollux is the southern star and is now the brighter of the two, but 300 years ago Castor outshone his brother. The word *Gemini* means "twins" and refers to Castor and Pollux. These stars are called the twins, al-

though one always has a greater magnitude than the other and one is a white star while the other is yellow.

Gemini rises in November.



Mythology

When Jason embarked on his Argonautic expedition the twin brothers, Castor and Pollux, accompanied him and materially aided in recovering the Golden Fleece.

The Romans believed the twins to be invincible in battle and they were sure of victory if Castor and Pollux rode at the head of their armies. Of them Homer wrote, "By turns they visit the ethereal sky, and live alternate and alternate die."

ORION

The Hunter

THIS is the brightest and most beautiful of all constellations seen in the Northern Hemisphere. The constellation, to a certain degree, resembles a huge upright rectangle, with three stars running diagonally across the central section.

The three central stars which form the Hunter's belt are: Mintaka, Alnilam, and Alnitak. On his left arm is a shield.

The bright stars forming the rectangle of Orion deserve special attention. The brilliant reddish star in the upper-left corner of the constellation is Betelgeuse. This star is variable in brightness and is second only to Rigel which is at the extreme lower-right in Orion. Rigel is blue-white in color. It is 543 light-years away and several hundred times brighter than the sun.



The bright star above Rigel is Bellatrix. The star in the lower-left corner in Orion is Saiph.

Just below the belt is the great nebula in Orion. This great mass of glowing gas is so large that it requires 25 years for light to go from one side to the other, and it requires 1800 years for that light to reach us.

CANIS MAJOR

Big Dog

If we follow the three stars in Orion's belt downward, we come to the brightest star of all. This is the Dog Star, Sirius. It is found in the constellation of Canis Major. Perhaps Sirius is known as the Dog Star because it served as a watchdog to warn the ancient Egyptians each year that the Nile River was rising and about to flood their valley. Sirius is blue-white in color. Since it is low in the winter sky, it twinkles more than a star that rises high. It is $8\frac{1}{2}$ light-years away and is 26 times as bright as the sun.

CANIS MINOR

Little Dog

Orion had another hunting dog which is considerably higher in the sky than Sirius and is eastward from Betelgeuse. This is the constellation of Canis Minor, a very small group of stars having the single bright star, Procyon. If we follow the upward direction of the stars in Orion's belt, we arrive at the big red star, Aldebaran, in Taurus.

Orion rises in November and is seen throughout the winter.

Mythology

In Orion it is not difficult to imagine just what the ancients pictured: a huge hunter who stands facing the mighty Bull, Taurus. His right arm, wielding a club, is stretched high toward Gemini.

We cannot possibly relate the many legends concerning Orion. Suffice it to say that in some he battles the Bull, Taurus; and because he was such a great and powerful hunter, he boasted that no animal was strong enough to escape him. To punish his vanity, a scorpion sprang from the earth and stung him on the heel, causing his death. This is pictured among the stars by the fact that Scorpius rises above the eastern horizon when Orion sinks below the western, a vanquished hero. After his death, Orion was placed among the stars at the request of Diana who loved him.



TAURUS, the PLEIADES, and HYADES

The Bull

TAURUS THE BULL, one of the constellations in the Zodiac, lies to the north of Orion. Taurus contains several bright stars, the brightest of which is Aldebaran. It is red in color and is 68 light-years distant. Aldebaran is 42 times larger than the sun. In this constellation we find a V-shaped group of stars known as the Hyades. Also in Taurus we find the Pleiades. This group appears as an open cluster of stars, and with the naked eye we may see six or seven of them. The brightest star in the Pleiades is Alcyone.

Taurus rises in October.

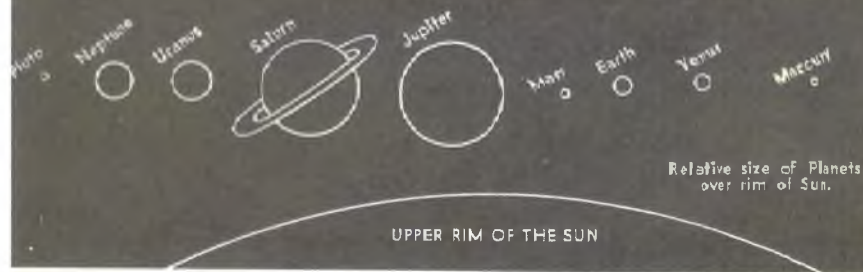
Mythology

For many years Taurus was honored as the leader of heavenly hosts, and in Egypt he was worshipped under the name of Apis and was identified with Osiris. He was the symbol of reincarnation—the perpetual return to life.

The Hyades in Taurus were the daughters of the demigod Atlas to whom Jupiter entrusted the infant Bacchus. So well did they attend to their duties that Jupiter gave them a place in the sky. They are frequently called the Rain Stars and they are associated with rainy weather. The Pleiades, located in the shoulder of the Bull, are celebrated in the legends of many ancient nations. They have been called the Virgins of Spring, the Seven Sisters, and the White Doves. They were the daughters of Atlas, in mythology. Orion the Hunter was attracted by their beauty and tried to catch them. They fled and called upon Jupiter for help. He changed them into doves and placed them among the stars.

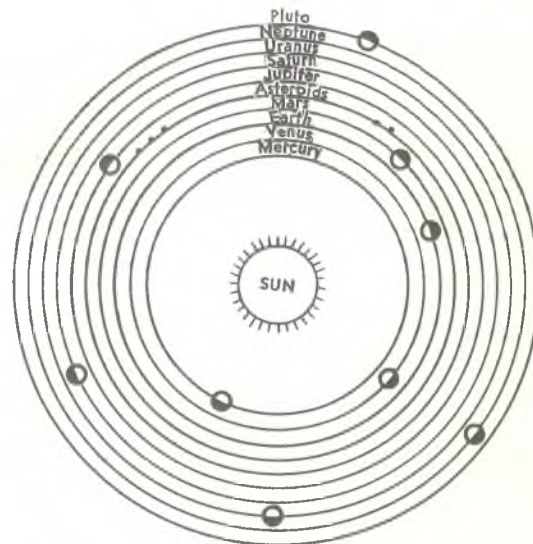


COMPARATIVE SIZES OF THE PLANETS



SOLAR SYSTEM

OUR SOLAR SYSTEM consists of a central sun with 9 planets revolving around it in their respective elliptical orbits. Many of the planets have satellites revolving around them. There are also a large number of comets revolving around the sun. Planets should not be spoken of as stars. Planets shine by reflecting the light of our sun. Stars, like our sun, shine by their own light. The word *planet* means wanderer.



26

THE SUN

Our sun, which looks to be about the size of a pie plate, is actually 865,000 miles in diameter. The sun is a star, but huge as the sun is, it is only a moderately small star. Its surface temperature is 10,000° F., while its internal heat rises to millions of degrees. It is now believed that the sun exists because of its own internal atomic energy. Its energy is given off by atomic processes. Terrific cyclonic storms sweep across its face. Huge sunspots come and go. The sun is 93 million miles from the earth. It is responsible for heat, light, and life on earth.

MERCURY

Mercury is the smallest planet in our solar system, being 3,100 miles in diameter. It is 36 million miles from the sun. Mercury turns once on its axis as it completes its journey around the sun every 88 days. That side of the planet which is turned toward the sun is very hot, having a possible temperature of 770 degrees. The other side is very cold. There is little or no atmosphere; hence, it could not be inhabited.

Mercury generally rises ahead of the sun or sets shortly after sunset. It is called a morning or evening star.

VENUS

Venus is known as a twin planet of the earth because of similarity in size, 7,700 miles in diameter. It is 67 million miles from the sun, and revolves around the sun in 225 days. We generally see Venus shortly before sunrise or immediately after sunset. It is, therefore, said to be one of our morning or evening stars. Venus exhibits phases like the moon, but it is at its brightest to us when it is in the crescent phase. The temperature there is 210 degrees on the surface below the clouds. The dense atmosphere makes the study of its surface impossible. Carbon dioxide prevails heavily in the atmosphere of Venus.

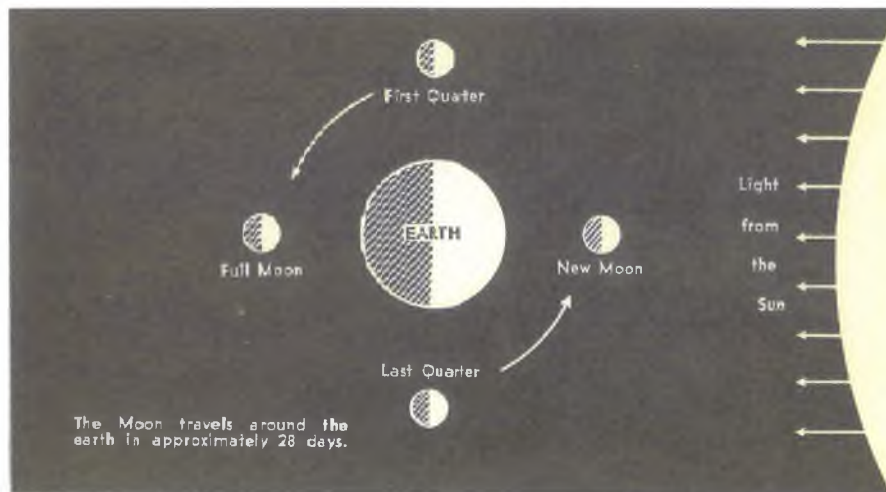
Neither Mercury nor Venus has satellites.

EARTH

The earth is 7,918 miles in diameter and revolves from west to east on its axis every 24 hours, causing day and night. It requires 365¼ days to travel in its orbit around the sun. The earth's rate of travel is 19 miles a second. The earth is 93 million miles from the sun.

Tipped 23½ degrees, the earth's northern axis points toward the North Star, Polaris, regardless of where the earth is in its orbit.

27



However, as it revolves from west to east, the northern axis of the earth is reeling in the opposite direction, and will point to stars in other constellations during its revolutionary period of retrogression. Such a period has a duration of 25,827 years.

We have the illusion that northern constellations are moving, instead of ourselves. Such an apparent movement is called the circum-polar precession.

MOON

THE MOON is the solitary satellite of the earth. The moon is 2,160 miles in diameter and travels around the earth in approximately 27 days. During this revolution it passes through its four phases of the first and last quarter, the full moon and the new or dark of the moon. The moon revolves once on its axis every 27 days, thus keeping the same side toward the earth. It has no light of its own, but reflects sunlight as do the nine planets in our solar system. The moon is a lifeless body, having no vegetation, streams, or animal life. It has no atmosphere, and its gravity is $\frac{1}{6}$ that of the earth. The pull of gravity of the moon acts on the oceans of the earth and causes our daily tides. It is very hot in the sunshine on the moon, with temperatures that rise above 200 degrees. In the shade of the cold side, the temperature drops to 200 degrees below zero. The moon is approximately 240,000 miles from the earth.

MARS

Mars, having a diameter of 4,221 miles, travels around the sun in 687 days. It is 141,700,000 miles from the sun. It turns on its axis like the earth in slightly less than 25 hours. Mars' axis is also tipped several degrees, as is that of the earth. Mars has received much publicity because of its peculiar markings, which are said to be canals.

We do not know that there is life on Mars, but we do know that it has seasons, and we regularly see its snows melt and brown areas turn green. The latter could be vegetation. Its atmosphere could be similar to that at the top of Mount Everest. Mars appears red because of the color of its stony ground. Mars has two satellites. These moons, which are named *Deimos* and *Phobos*, circle around the planet.

ASTEROIDS

Between Mars and the next outward planet, Jupiter, are the Asteroids. These are thought to be the fragments of a disintegrated planet. These fragments, of which about 1600 are known, travel in their respective orbits around the sun. There is not a great deal known about them, although some of the larger, which are several hundred miles in diameter, have been named. The largest is known as Ceres.

JUPITER

Jupiter is the largest planet in our solar system. Its diameter is 86,850 miles. It is 483,900,000 miles from the sun. Jupiter turns on its axis in slightly less than 10 hours, and it requires 12 years to travel around the sun. Jupiter has at least 11 satellites, four of which are visible through small telescopes. The largest of these moons is about the size of Mercury. There is a thick layer of atmosphere surrounding Jupiter which makes it impossible for us to see its surface. In its atmosphere are great quantities of ammonia and methane gas. The peculiar markings seen on the planet are doubtless caused by atmospheric conditions. The maximum temperature of Jupiter is 216 degrees below zero.

SATURN

Saturn, the next planet to Jupiter in size, is 71,600 miles in diameter. It is known to have less density than Jupiter, and its weight is about that of an equal volume of cork. Saturn is 887,100,000 miles from the sun. It requires 29 of our years for it to travel once around the sun. Saturn's day is a little more than 10 hours long. It has at least nine satellites. Saturn is the only heavenly object, as far as man knows, that has rings around it. These rings are three in number,

and are of great width. The rings are composed of tiny moonlets, or the fragments of disintegrated moons which once swung around this planet. Its maximum temperature reaches 300 degrees below zero.

URANUS

The next planet outward from Saturn is Uranus. It is 32,000 miles in diameter and 1,786,000,000 miles from the sun. Uranus is not visible to the naked eye. It takes 84 years for Uranus to complete its revolution around the sun. Its period of rotation is $10\frac{3}{4}$ hours. Uranus has four satellites. Uranus was discovered by William Herschel in 1781. The planets previously mentioned have long been known to mankind, and Uranus was the first planet to be "discovered."

NEPTUNE

Neptune is the sister planet to Uranus, being only 1,000 miles less in diameter. It is 2,790,000,000 miles from the sun. It revolves in 19 hours, and requires 164 years to travel around the sun. Neptune has one satellite. Neptune is never seen with the naked eye. It was discovered by Galle, but predicted by Adams of England and Leverrier of France. Neptune is very cold, receiving only $1/1000$ of the illumination which warms the earth.

PLUTO

The ninth and last planet in the sun's solar system is Pluto. This small planet, having a diameter of 3,600 miles, was discovered by the Percival Lowell Observatory in 1930. At its great distance, Pluto requires 249 years to pass in its orbit around the sun. Pluto is a very cold planet, and it takes the light from the sun $5\frac{1}{2}$ hours to reach it. The sun is 3,683,600,000 miles distant.

It is not improbable that there are other planets patrolling the skies beyond Pluto. Such astronomers as Pickering, Forbes, and Flammarion believed that there are. We know that the sun's gravitational sphere of control extends far beyond Pluto, and this makes it possible for yet unknown planets to exist.

STARS

STARS ARE self-luminous suns. They are spheres of intensely hot gas that exist for billions of years. Their vast distances are almost incomprehensible. Their sizes, for the most part, are much greater than

the sun. Some stars are variable—that is, their light becomes bright and then faint. The color of a star denotes its temperature.

It appears that the sun and stars actually rise in the east and set in the west. However, this is not true, for it is the rotation of our earth which makes them appear to do so. The same stars do not rise at the same time each month, for there is a gain of approximately four minutes each day or two hours each month. Thus, if the star Sirius rises at 10 o'clock in November, it will rise at 8 o'clock in December.

With the naked eye we can see possibly three thousand stars. The brightness of a star is designated as its magnitude. Without a telescope, we cannot see stars of less than the sixth magnitude.

THE LIGHT-YEAR

It is difficult to reckon the enormous distances of stars in miles; therefore astronomers have agreed upon certain terms to assist them in their calculations. One of these is the light-year. This is based on the speed of light, which is 186,324 miles per second. At this speed light would travel 5,875,913,664,000 miles in one year. This is nearly six trillion miles!

The nearest star other than our sun is Alpha in the constellation of Centaurus. It is 4.3 light-years distant. In other words, it takes the light from that star 4.3 years to reach us. Many stars are hundreds, even thousands of light-years distant from the earth.

COMETS and METEORS

COMETS TRAVEL through our solar system, and it is known that all of them move around our sun. The head of a comet is always turned toward the sun and the tail away from it. They vary in size, frequently being as large as 100,000 miles in diameter. The comet's tail may be millions of miles long. There are many comets, although not many are seen with the naked eye. Halley's comet was witnessed by many in 1910, and will be seen again in 1986. Astronomers have determined some of the materials to be found in comets. The head is a condensed nucleus giving off a misty haze. The tail is a train of tenuous, gaseous matter.

Meteors are those luminous objects which flash across the night sky and which we, as children, were taught to be falling stars. Thousands of these visitors from outer space may be seen every night. Very few meteors reach the earth; however, those that do, have already become cold and solid and for the most part reveal a preponderance of iron content.

Meteors are those luminous objects which flash across the night sky and which we, as children, were taught to be falling stars. Thousands of these visitors from outer space may be seen every night. Very few meteors reach the earth; however, those that do, have already become cold and solid and for the most part reveal a preponderance of iron content.

PRECESSION of the EQUINOXES

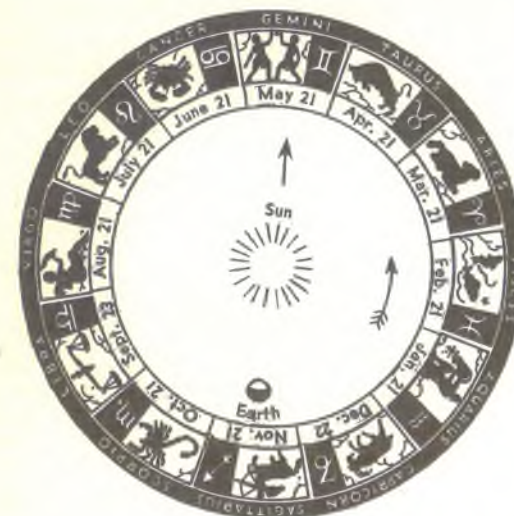
The earth spins counterclockwise on its axis as it moves around the sun. Its axis also has another movement—a wobbling motion in the opposite direction, like that of a dying top. If the axis of the earth were extended, it would describe a large circle of $23\frac{1}{2}$ degrees radius on the celestial sphere, and in a given period of time would point to various stars in many constellations. It takes 25,827 years to complete this circle. This long-period wobbling movement is called the precession of the equinoxes, and results in a change of our North Star. Such a circle passes near Thuban in Draco, which was the Pole Star in 3000 B.C. In the future, it will pass through Gamma in Cepheus in 6000 A.D., Deneb in Cygnus in 10,000, Vega in Lyra in 13,000, and Gamma in Hercules in 16,000.

This wobbling movement of the pole causes the equinoctial points to glide along the ecliptic through the 12 zodiacal constellations in 25,827 years. The equator of the earth always retains approximately the same angle with the plane of the ecliptic.

THE ZODIAC

THE APPARENT path of the sun among the stars is known as the ecliptic. The ecliptic runs through the center of the zone called the Zodiac. The Zodiac is 16 degrees wide, and the sun, moon, and planets appear to move within its boundaries. There are 12 constellations along the ecliptic which seem to encircle the celestial sphere. These are called the zodiacal constellations and their names are: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius, and Pisces.

The Zodiac has been divided into 12 equal sections, each 30 degrees long, beginning at the vernal equinox. Such sections are called *signs* and have been given the same names as the 12 constellations in the zodiac.



The 12 constellations or signs of the Zodiac.

The sun is usually at the vernal equinox in Aries on March 21 each year and enters each succeeding sign on about the 21st of the month. As the earth revolves in its orbit around the sun it causes the sun to have a different constellation in the background every month. The sun's brightness makes the stars invisible during the day, but if we could see the constellations the sun would appear to travel from one sign or constellation of the zodiac to the next each month.

At one time the signs and constellations of the same name were in very nearly the same positions but now they are not, due to the Precession of the Equinoxes. As the Precession moves westward along the ecliptic there is a gain of 52 seconds a year. The signs of the Zodiac are seldom used now by astronomers.

THE ROSICRUCIAN LIBRARY

VOLUME

- I Rosicrucian Questions and Answers with Complete History of the Order.
- II Rosicrucian Principles for the Home and Business.
- III The Mystical Life of Jesus.
(The hidden facts of his life.)
- IV The Secret Doctrines of Jesus.
- V "Unto Thee I Grant . . ."
(Secret Teachings of Tibet.)
- VI A Thousand Years of Yesterdays.
(A Story of Reincarnation.)
- VII Self Mastery and Fate with the Cycles of Life.
(A chart of your life.)
- VIII Rosicrucian Manual.
- IX Mystics at Prayer.
(Compilation of Prayers.)
- X Behold the Sign.
(A Book of Ancient Symbolism.)
- XI Mansions of the Soul, The Cosmic Conception.
- XII Lemuria—The Lost Continent of the Pacific.
- XIII The Technique of the Master.
- XIV The Symbolic Prophecy of the Great Pyramid.
- XV The Book of Jasher.
(The suppressed book of the Bible.)
- XVI The Technique of the Disciple.
- XVII Mental Poisoning.
- XVIII Glands—Our Invisible Guardians.
- XIX Along Civilization's Trail. (Out of Print)
- XX The Word Went Forth. (Out of Print)
- XXI What to Eat—And When.
- XXII The Sanctuary of Self.
- XXIII Sepher Yezirah.
- XXIV Of Gods and Miracles.

Other volumes will be added from time to time.
Write for Complete Catalogue.

THE BRIGHTEST STARS NORTH OF LATITUDE 40

Name	Constellation	Magnitude	Distance in Light-Years
The Sun		-25.4	8 min. and 19 sec. only
Sirius	Canis Major	-1.58	8.8
Vega	Lyra	0.14	26
Capella	Auriga	0.21	45
Arcturus	Boötes	0.24	36
Rigel	Orion	0.34	650
Procyon	Canis Minor	0.48	11.3
Altair	Aquila	0.89	16.5
Betelgeuse	Orion	0.9	650
Aldebaran	Taurus	1.06	68
Pollux	Gemini	1.21	35
Spica	Virgo	1.21	160
Antares	Scorpius	1.22	170
Fomalhaut	Piscis Australis	1.29	23
Deneb	Cygnus	1.33	540
Regulus	Leo	1.34	84

The above are known as first magnitude stars, although some are brighter and some are slightly fainter than what is known as magnitude 1.

The North Star, Polaris, is of magnitude 2.

The nearest star, Alpha, in the constellation of Centaurus, cannot be seen from latitude 40° N. It is of magnitude 1 and its distance is 4.3 light-years.

